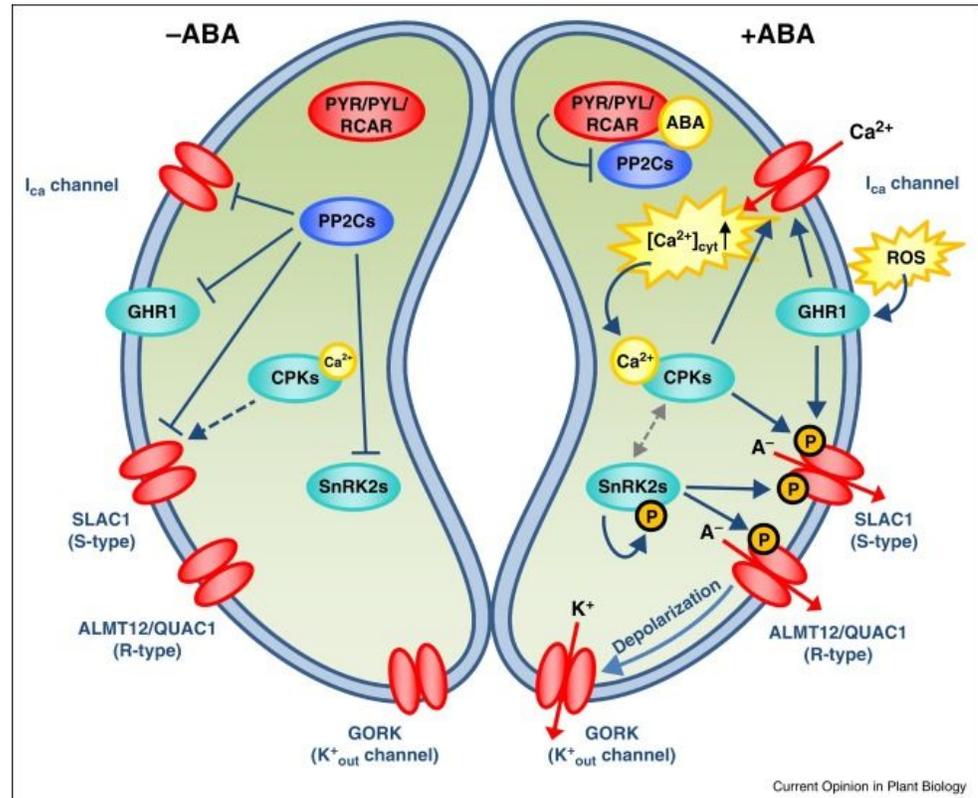
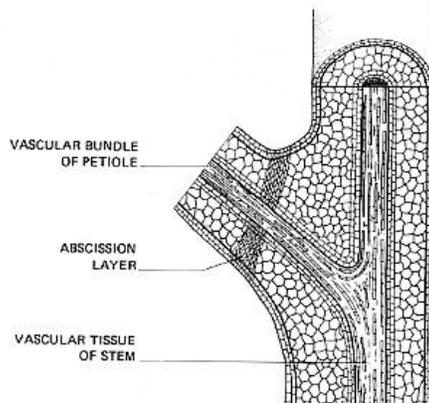


Research Report:



I. Anatomy



II.

i. Physiology

1. Abscission layer releases leaves from stem, chemical interaction releases stress from leaves

ii. Ecology

1. They need abscisic acid to respond to changes in water levels in the environment. For example, lack of rain would require stomata to encapsulate and safeguard water until it rains

iii. Mutation

1. The single base substitution of the gene corresponding to the *Ler* ecotype impacts water levels
 2. The mutation can lead to detachment of leaves or having no leaf detachment if it's abscisic acid deficient, insensitive, or wild type
 3. Because of the mutation the stem growth of the seeds will vary based on their response to abscisic acid
- b. It is important to know about the relationship between ABA and water levels because it affects leaf detachment and the opening of stomata. Leaf detachment occurs because the plant is trying to conserve water.
- c. Farmers would be interested in our results. They would be interested because they would find out how much water their plants should be given, also about their crop rotations. Biotech companies would also be interested to better their products.
- d. Assmann, Sarah M., et al. "ABA-Deficient (*aba1*) and ABA-Insensitive (*abi1-1*, *abi2-1*) Mutants of *Arabidopsis* have a Wild-Type Stomatal Response to Humidity." *Plant, Cell & Environment*, vol. 23, no. 4, 25 Dec. 2001. Wiley Online Library, doi:10.1046/1365-3040.2000.00551. Accessed 30 Sept. 2018.
- e. "Mechanisms of abscisic acid-mediated control of stomatal aperture." 2015. ScienceDirect, Elsevier, 2015, www.sciencedirect.com/science/article/pii/S1369526615001661. Accessed 4 Oct. 2018.

- f. "Abscisic acid (ABA)." Kimball's Biology Pages, 12 Aug. 2016, www.biology-pages.info/A/ABA.html. Accessed 23 Oct. 2018.

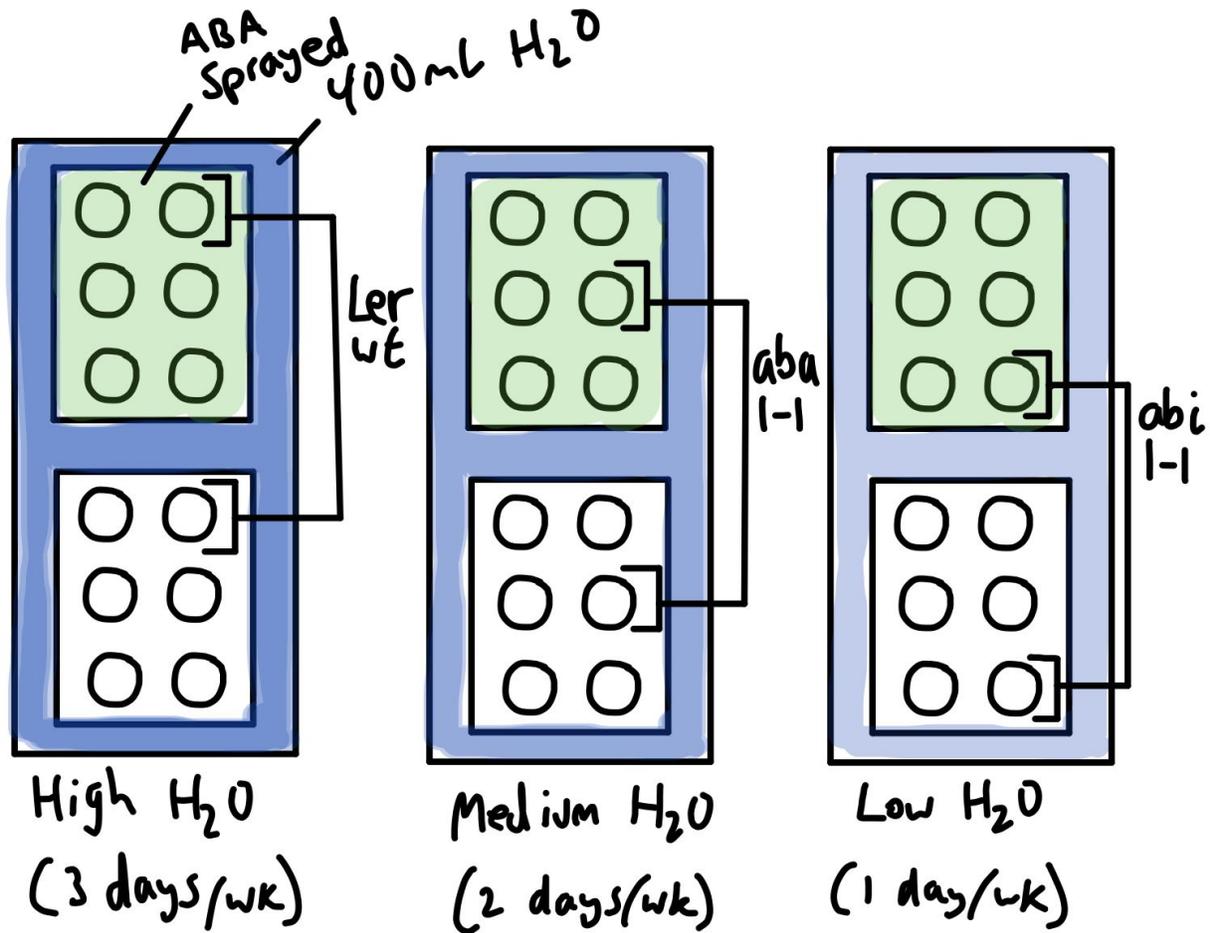
Research Question:

- a. We want to discover the effect of production levels of abscisic acid in conjunction with water levels on the length of stems and number of leaves in *Ler wt*, *aba1-1*, and *abi1-1*.
- b. We will test the effect of amounts of abscisic acid on *Arabidopsis thaliana* in conjunction with water levels by manipulating the amount of water and abscisic acid and measuring the number of leaves and stem length.

Research Methods:

- a. The greater the water and abscisic acid, the less likely leaves will fall from the plants and the less they will grow
- b. We will take our wild type, ABA1-1 and ABI1-1 seeds and grow them all in different water levels and with and without abscisic acid

c. Experimental Design



i. Plastic bins, 4 *aba1-1* seeds, 4 *abi1-1* seeds, 2 *Ler wt* seeds, water, ruler, abscisic acid

1. IV:

- Water levels (high or low) - amount of stomata openings will cause better or worse growth with water amounts
- Abscisic acid (sprayed or not) - depending on the mutant, there will be different reactions to the acid

2. DV:

- Number of leaves which is dependent on water and abscisic acid

b. Length of stem (in centimeters) of the hypocotyl which is also dependent on water and abscisic acid

3. CV:

a. Location, temperature, containers used, sunlight, type of water used, type of abscisic acid used

4. Procedures:

a. Setup:

- i. Plant: We will plant all of our wild type and mutant seeds in their individual containers separated by wt, *aba1-1* and *abi1-1* bins
- ii. Add complexity: The wild type will have different water levels only. The other two mutants will each have unique combinations of abscisic acid and water amounts
- iii. Prepare: Once each seed has its unique variation, all will be placed in a controlled environment to observe over time

b. Experimentation:

- i. Experiment: Each day water levels will be maintained at high or low amounts and abscisic acid will either be applied or not
- ii. Examine: We will record the length of the stem and amount of leaves each day

d. Data Evaluation:

- i. If the mutant that is both affected by abscisic acid and high water levels loses less leaves and grows less than

the mutant without abscisic acid (with or without high water levels), then our hypothesis will be correct